

REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested.

Claims 1-8, 26-33, 51-55 and 61-69 are currently pending, wherein claims 1, 5, 26, 30, 51, 55 and 61-68 are independent. Claims 9-25, 34-50, 56-60 have been canceled. Renumbered claims 64, 65, 68 and 69 have been withdrawn from consideration. Renumbered claims 62-69 have been amended merely to put these claims in proper numerical order. These amendments are not made for any purpose related to patentability and do not narrow or otherwise limit the scope of the claims. No new matter has been introduced by way of these amendments.

Applicants note with appreciation the acknowledgment by the Patent Office of the Information Disclosure Statements previously submitted to the Patent Office.

Applicants would like to thank Examiner Tan Mai for the personal interview conducted on October 26, 2004. In compliance with M.P.E.P. § 713.04, the substance of that interview is incorporated in the foregoing amendments and in the following remarks.

In the second section of the Office Action, the abstract of the disclosure is objected to, because legal phraseology is used, and the abstract contains an undefined acronym. Applicants hereby amend the abstract to change "comprising" to "including" and to define the acronym "FIR". These amendments are fully supported by the present application. No new matter has been introduced by way of these amendments. Accordingly, reconsideration and withdrawal of these grounds of objection are respectfully requested.

During the interview, the rejection of claims 6-8 and 61 under 35 U.S.C. § 112, second paragraph for alleged indefiniteness was discussed. No agreement was reached.. This rejection is respectfully traversed.

The Patent Office asserts that the phrase “a controller to synchronize said coefficient generator with each of said N memories” recited in, for example, claim 6 is allegedly misdescriptive. According to M.P.E.P. § 2173.02,

[t]he examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph, is whether the claim meets the threshold requirements of clarity and precision, *not* whether more suitable language or modes of expression are available. . . . Some latitude in the manner of expression and the aptness of terms should be permitted even though the claim language is not as precise as the examiner might desire. Examiners are encouraged to suggest claim language to applicants to improve the clarity or precision of the language used, *but should not reject claims or insist on their own preferences if other modes of expression selected by applicants satisfy the statutory requirement.* [M.P.E.P. § 2173.02 (emphasis added)]

Given the “latitude in the manner of expression and the aptness of terms” afforded to the Applicants, it is respectfully submitted that the aforementioned claims are clear and precise and fully comply with the requirements of 35 U.S.C. § 112, second paragraph.

During the interview, the Patent Office stated that it is interpreting the term “synchronize” to mean “to operate *all* at the same time.” However, it is respectfully submitted that such an interpretation is not supported by the claim language and the specification, and that the Patent Office misunderstands and misinterprets these claims.

According to exemplary embodiments, with reference to Figure 9 of the present application, a controller 55 “sequentially selects the coefficient to be provided by the LMS engine 50 and a respective memory (80-1 . . . 80-n) to store the coefficient.” [present application, page 25, paragraph 0105] The controller 55 enables *each* of the memories in

synchronization with the LMS engine 50 when a memory's corresponding coefficient is output by the LMS engine 50. In other words, the controller 55 synchronizes the LMS engine 50 with *each* of the memories in turn as they are sequentially selected to ensure that the coefficient output by the LMS engine 50 is stored in the appropriate memory. [see present application, pages 27-28, paragraph 0107] Thus, as recited in claims 6-8 and 61, the synchronization is performed by the controller between the coefficient generator and a memory, for each of the memories. Therefore, it is respectfully submitted that the Patent Office's interpretation of the word "synchronize" is incorrect and unfounded.

Consequently, it is respectfully submitted that claims 6-8 and 61 are clear and precise and particularly point out and distinctly claim the subject matter that Applicants regard as the invention, in full and complete compliance with 35 U.S.C. § 112, second paragraph. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

During the interview, the rejection of claims 1-3, 5-8, 26-28, 30-33, 51-53, 61 and renumbered claims 62, 63, 66 and 67 under 35 U.S.C. § 103(a) as allegedly being unpatentable over either Morrow (U.S. Patent No. 3,665,171, hereinafter "Morrow") or Sumi et al. (U.S. Patent No. 5,235,538, hereinafter "Sumi") in view of Shanks (U.S. Patent No. 3,703,632, hereinafter "Shanks") was discussed. No agreement was reached. This rejection is respectfully traversed.

In a conventional FIR filter, the coefficients supplied to their respective multipliers each contain a plurality of bits. For example, each coefficient can be 13 bits. An LMS engine can supply the coefficients to the multipliers by respective wirings. Consequently, each coefficient would require 13 conductors per wiring or a total of 2080 conductors for 160

taps. An FIR filter having 2080 conductors is more complex and consumes a significant amount of area which results in a larger die size. According to exemplary embodiments of the present invention, and as illustrated in Figure 9 of the present application, the previously-discussed problem can be overcome by sharing wirings for all of the coefficients supplied from LMS engine 50 to its corresponding tap of the FIR filter. Thus, by using shared wiring according to exemplary embodiments, a significant area savings in the die size can be achieved, allowing for smaller semiconductor chips and more efficient use of the space on these chips. [*see* present application, pages 24-25, paragraphs 0104-0105]

As acknowledged by the Patent Office, neither Morrow nor Sumi disclose or suggest the feature of a shared wiring, as recited, for example, in claim 1 of the present application. In addition, it is respectfully submitted that neither Morrow nor Sumi disclose or suggest the features of: a first control conductor; a second control conductor; a first memory coupled to a second end of the shared wiring and coupled to a second end of the first control conductor to store the first coefficient in response to the controller; and a second memory coupled to the second end of the shared wiring and coupled to a second end of the second control conductor to store the second coefficient in response to the controller.

Shanks discloses a recursive filter that is configured to emphasize only some of the frequency components of signals with respect to others. [*see* Shanks, Abstract] The recursive filter uses a discrete convolution device to feed back the output to the input in a particular fashion. The device used two storage mediums, one which contains the values of the filter coefficients and the other that initially contains the input data values and (later) the computer output data values. As each output value is computed by convolving the filter coefficients with the input data values, the device stores that value back into a specific selected location in

the input data storage. This causes the device on each new cycle of operation to convolve previously computed output values with the filter coefficients, along with the remaining input values. [*see* Shanks, column 3, lines 19-32]

As illustrated in Figure 1 of Shanks, a second storage unit 26 is used to store the filter coefficients. According to Shanks, the second storage unit 26 “contains input contacts 27 and output contacts 28, permitting data to be selectively stored in the individual memory cells and to be selectively read out upon operation of the appropriate read control 29 and write control 30.” [Shanks, column 5, lines 53-57] Write control 30 controls access to the various cells of the second storage unit 26. As disclosed by Shanks, “[i]n order to store a value into a particular preselected location (address) in the [second storage unit 26], this address in write control [30] opens appropriate gates in the [second storage unit 26] and allows the input value on line [37] to be stored in the preselected memory cell at the preselected location.” [Shanks, column 4, lines 50-60, noting that “[r]ead control 29 and write control 30 physically are the same kind of units as write control 16 and read control 23,” according to Shanks, column 5, lines 57-59]

Thus, it is respectfully submitted that Shanks discloses a structure fundamentally different than that recited in, for example, claim 1 of the present application. According to exemplary embodiments of the present invention, wiring is shared for *all* of the coefficients supplied from LMS engine 50 to its corresponding tap of the FIR filter. [*see* present application, page 25, paragraph 0105] Referring to Figure 9 of the present application, “LMS 50 supplies each of the coefficients via *a shared or common set of wirings* to a respective memory (80-1 . . . 80-n) for each corresponding tap.” [present application, page 25, paragraph 0105 (emphasis added)] In complete contrast, and contrary to the assertions of the

Patent Office, it is respectfully submitted that line 37 illustrated in Figure 1 of Shanks is not a "shared wiring." Rather, line 37 is a *single* line that can be connected between external filter coefficient source 34 and *only one* of the memory cells of second storage unit 26 at any time using the appropriately selected contact 28. Thus, according to Shanks, to store a coefficient value in a memory cell of second storage unit 26, the contact 28 of the preselected memory cell must be engaged to allow the coefficient value to be stored in the preselected location via line 37. However, another, different contact 28 must be engaged to store a coefficient value in a different preselected memory cell via line 37.

In contrast to Shanks, exemplary embodiments use a shared wiring that is coupled to each of the memories. For example, claim 1 recites the features of a first memory *coupled to a second end of the shared wiring*, and a second memory *coupled to the second end of the shared wiring*. Thus, the shared wiring is coupled to *both* the first memory and the second memory. Shanks discloses a different structure in which the line 37 can be coupled to *only one* of the memory cells of second storage unit 26 at one time, but not more than one.

Therefore, it is respectfully submitted that Shanks does not disclose or suggest the features of a shared wiring, a first memory *coupled to a second end of the shared wiring*, and a second memory *coupled to the second end of the shared wiring*. Therefore, it is respectfully submitted that Shanks does not address the above-identified deficiencies of both Morrow and Sumi.

In addition, according to M.P.E.P. § 2143, to establish a *prima facie* case of obviousness, three basic criteria must be met. In particular, "[t]o establish *prima facie* obviousness of a claimed invention, *all* the claim limitations must be taught or suggested by the prior art." [M.P.E.P. § 2143.03 (emphasis added)] It is respectfully submitted that the

Patent Office has failed to point out where numerous features of claim 1 are allegedly disclosed or suggested in the combination of Morrow or Sumi and Shanks in its attempt to render the claims obvious. For example, *nowhere* in the Office Action does the Patent Office specify where Morrow, Sumi or Shanks discloses or suggests the features of a first control conductor and a second control conductor. In addition, *nowhere* in the Office Action does the Patent Office specify where Morrow, Sumi or Shanks discloses or suggests the features of a first memory coupled to a second end of the shared wiring and *coupled to a second end of the first control conductor* to store the first coefficient in response to the controller, and a second memory coupled to the second end of the shared wiring and *coupled to a second end of the second control conductor* to store the second coefficient in response to the controller.

For example, Shanks merely discloses that “[t]he external coefficient source 34 has a channel 35 which generates along with each external filter coefficient signal an address signal, which is imposed on write control 30 to locate the appropriate contact 28 for the unit cell in which a particular designated filter coefficient is to be stored.” [Shanks, column 6, lines 2-7] In other words, the Patent Office has not pointed out where or how the combination of Morrow or Sumi with Shanks discloses first and second control conductors, and first and second memories that are each coupled to the shared wiring and to an end of first and second control conductors, respectively. Consequently, it is respectfully submitted that because the Patent Office has failed to show that the combination of Morrow or Sumi with Shanks teaches or suggest each and every feature of claim 1, the Patent Office has failed to establish a *prima facie* case of obviousness.

If this rejection is repeated, the Patent Office is requested to specifically point out where Morrow, Sumi or Shanks discloses or suggests these features.

In addition, “[t]o establish a *prima facie* case of obviousness . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.” [M.P.E.P. § 2142] “There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art.” [M.P.E.P. § 2143.01] It is respectfully submitted the Patent Office has provided no reference, citation or other support, in Morrow, Sumi, Shanks or otherwise, for the bald and unsupported assertion that “the proposed device [of the combination of references] is a FIR filter having ‘shared wiring’ for storing the desired coefficients as claimed.” Again, it is respectfully submitted that the Patent Office has failed to establish a *prima facie* case of obviousness.

If this rejection is repeated, the Patent Office is requested to specifically provide a reference, point out a citation, or provide credible support for such a bald and unfounded assertion.

Rather, it is respectfully submitted that the Patent Office is using impermissible hindsight in an attempt to render the claims of the present application obvious. According to M.P.E.P. § 2142, “[t]o reach a proper determination under 35 U.S.C. 103, . . . impermissible hindsight must be avoided and the legal conclusion [of obviousness] must be reached on the basis of the facts gleaned from the prior art.” Furthermore, according to M.P.E.P. § 2143.01, “[t]he mere fact that references can be . . . modified does not render the resultant combination obvious unless the prior art also suggests the desirability of [such modification].” [citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)] By stating that the motivation for combining the references in the manner suggested by the Patent Office is to “mak[e] the

claimed invention,” it is respectfully submitted that Patent Office has clearly and unequivocally used impermissible hindsight to re-construct Applicants’ invention from the given references using Applicants’ own disclosure as a template. Since the Patent Office has offered no proper support or motivation for combining the references, it is respectfully submitted that the rejection based on obviousness is wholly and completely founded upon “knowledge gleaned only from applicant’s disclosure.” [see M.P.E.P. § 2145] Consequently, it is respectfully submitted that the rejection entails hindsight and is, therefore, improper.

As the combination of Morrow or Sumi with Shanks does not disclose or suggest the features of a shared wiring, a first control conductor, a second control conductor, a first memory *coupled to a second end of the shared wiring and coupled to a second end of the first control conductor* to store the first coefficient in response to the controller, and a second memory *coupled to the second end of the shared wiring and coupled to a second end of the second control conductor* to store the second coefficient in response to the controller, it is respectfully submitted that the combination of Morrow or Sumi with Shanks does not render the subject matter of claim 1 obvious.

Independent claims 5, 26, 30, 51, 55, 61 and renumbered independent claims 62, 63, 66 and 67 recite features similar to those recited in independent claim 1, and are, therefore, patentably distinguishable over the combination of Morrow or Sumi with Shanks for at least those reasons stated above with regard to claim 1.

Dependent claims 2-3, 6-8, 27-28, 31-33 and 52-53 variously depend from independent claims 1, 5, 26, 30 and 51, and are, therefore, patentably distinguishable over the combination of Morrow or Sumi with Shanks for least those reasons stated above with regard to claims 1, 5, 26, 30 and 51.

For at least the foregoing reasons, it is respectfully submitted that the combination of Morrow or Sumi with Shanks does not render the subject matter of claims 1-3, 5-8, 26-28, 30-33, 51-53, 61 and renumbered claims 62, 63, 66 and 67 obvious. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

In the sixth section of the Office Action, claims 4, 29 and 54 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over either Morrow or Sumi in view of Shanks, and further in view of Lish (U.S. Patent No. 5,050,119, hereinafter "Lish"). This rejection is respectfully traversed.

Dependent claims 4, 29 and 54 variously depend from independent claims 1, 26 and 51, and are, therefore, patentably distinguishable over the combination of Morrow or Sumi with Shanks and Lish for least those reasons stated above with regard to claims 1, 26 and 51. For example, it is respectfully submitted that Lish does not disclose or suggest the features of a shared wiring, a first control conductor, a second control conductor, a first memory *coupled to a second end of the shared wiring and coupled to a second end of the first control conductor* to store the first coefficient in response to the controller, and a second memory *coupled to the second end of the shared wiring and coupled to a second end of the second control conductor* to store the second coefficient in response to the controller. Therefore, it is respectfully submitted that Lish does not address the above-identified deficiencies of Morrow, Sumi and Shanks.

In addition, it is respectfully submitted the Patent Office has provided no reference, citation or other support, in Morrow, Sumi, Shanks, Lish or otherwise, for the bald and unsupported assertion that "the proposed device is a FIR filter having 'shared wiring' and

'variable delay' for storing the desired coefficients as claimed." Again, it is respectfully submitted that the Patent Office has failed to establish a *prima facie* case of obviousness.

If this rejection is repeated, the Patent Office is requested to specifically provide a reference, point out a citation, or provide credible support for such a bald and unfounded assertion.

Rather, it is respectfully submitted that the Patent Office is using impermissible hindsight in an attempt to render the claims of the present application obvious. By stating that the motivation for combining the references in the manner suggested by the Patent Office is to "mak[e] the claimed invention," it is respectfully submitted that Patent Office has clearly and unequivocally used impermissible hindsight to re-construct Applicants' invention from the references using Applicants' own disclosure as a template. Since the Patent Office has offered no proper support or motivation for combining the references, it is respectfully submitted that the rejection based on obviousness is wholly and completely founded upon "knowledge gleaned only from applicant's disclosure." [*see* M.P.E.P. § 2145] Consequently, it is respectfully submitted that the rejection entails hindsight and is, therefore, improper.

For at least the foregoing reasons, it is respectfully submitted that the combination of Morrow or Sumi with Shanks and Lish does not render the subject matter of claims 4, 29 and 54 obvious. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

All of the objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and a notice to that effect is earnestly solicited. Should the Examiner have any questions regarding this response or the application in general, the Examiner is urged to contact the Applicant's attorney, Andrew J. Bateman, by telephone at (202) 625-3547. All correspondence should continue to be directed to the address given below.

Respectfully submitted,

By: Andrew J. Bateman
Andrew J. Bateman
Attorney for Applicant
Registration No. 45,573

Intellectual Property Department
Marvell Semiconductor, Inc.
700 First Avenue, Mail Stop 509
Sunnyvale, CA 94089
Facsimile No.: (408) 752-9034